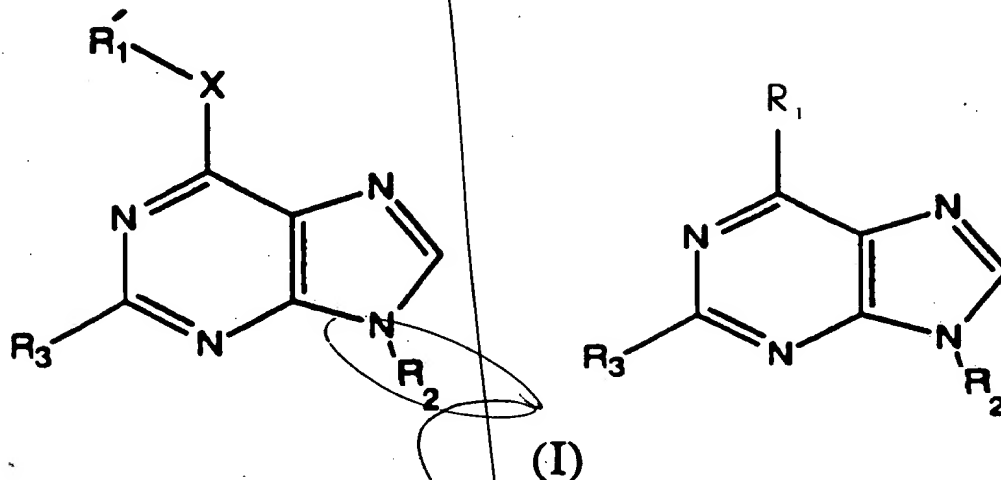


What we claim is:

1. A 2,6,9-trisubstituted purine composition of matter having the following formula:



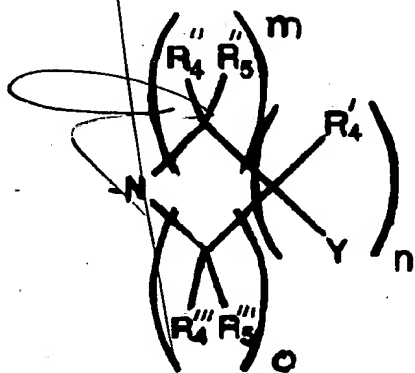
wherein R_1 is halogen or R'_1-X wherein $X = NH, O, S, S(O_2)$.

R'_1 is alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, CF_3 , heteroaryl, heterocyclyl, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $SO_2NR^{20}R^{23}$, $SO_2NR^{20}COR^{21}$, $SO_2NR^{20}CONR^{20}R^{23}$, $SO_2NR^{20}CO_2R^{21}$, $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}CONR^{20}R^{23}$, $N(R^{20})C(NR^{20})NHR^{23}$, $NR^{20}SO_2R^{21}$, OR^{20} , $OCONR^{20}R^{23}$, $OCONR^{20}SO_2R^{21}$, $OCONR^{20}R^{23}$, CN , CO_2R^{20} , $CONR^{20}R^{23}$, $CONR^{20}SO_2R^{21}$ and COR^{20} ;

R_2 is a hydrogen or hydrocarbon selected from the group alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms,

which alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $SO_2NR^{20}R^{23}$, $SO_2NR^{20}COR^{21}$, $SO_2NR^{20}CONR^{20}R^{23}$, $SO_2NR^{20}CO_2R^{21}$, $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}CONR^{20}R^{23}$, $N(R^{20})C(NR^{20})NHR^{23}$, $NR^{20}SO_2R^{21}$, OR^{20} , $OCONR^{20}R^{23}$, $OCONR^{20}SO_2R^{21}$, $OCONR^{20}R^{23}$, CN , CO_2R^{20} , $CONR^{20}R^{23}$, $CONR^{20}SO_2R^{21}$ and COR^{20} ;

R_3 is a halogen, hydroxyl, thio, alkoxy, alkylthio, alkyl, $-NR_4R_5$ or a component having the formula:



where $m=1-3$, $n=1-3$, $o=1,3$, y =carbonyl, $-NR_4R_5$, hydroxyl, thiol, alkoxy, alkylthiol;

R_4 and R_5 are each independently hydrogen, OR^{20} , $NR^{20}R^{23}$, or a hydrocarbon selected from the group including alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $SO_2NR^{20}R^{23}$, $SO_2NR^{20}COR^{21}$, $SO_2NR^{20}CONR^{20}R^{23}$, $SO_2NR^{20}CO_2R^{21}$, $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$,

NR²⁰CONR²⁰R²³, N(R²⁰)C(NR²⁰)NHR²³, NR²⁰SO₂R²¹, OR²⁰, OCONR²⁰R²³,
OCONR²⁰SO₂R²¹, OCONR²⁰R²³, CN, CO₂R²⁰, CONR²⁰R²³, CONR²⁰SO₂R²¹ and COR²⁰;

with the proviso that when Y is carbonyl, Y and R'₄ together may be a single oxygen atom,

R₄^{''} and R₅^{''} together may be a single oxygen atom, R₄^{'''} and R₅^{'''} may together be a single

oxygen atom, and wherein when R₃ is 2-hydroxyethylamino and R₂ is methyl, R₁'-X is not

amino, 3-methyl-2-butenylamino, benzylamino, or m-hydroxybenzylamino, [when R₃ is not 2-

hydroxyethylamino, when R₂ is isopropyl, R₁'-X is not benzylamino, m-hydroxybenzylamino,

or 3-methylbutylamino, when R₃ is 2-hydroxyethylamino and R₂ is 2-hydroxyethyl, R₁'-X is

not benzylamino and when R₃ is selected from the group consisting of 2-methyl-2-

hydroxypropylamino, and 2-dimethylaminoethylamino, and when R₂ is methyl, then R₁'-X is

not benzylamino;

R²⁰ is a member selected from the group consisting of H, C₁₋₁₅ alkyl, C₂₋₁₅ alkenyl, C₂₋

15 alkynyl, heterocyclyl, aryl, and heteroaryl, which alkyl, alkenyl, alkynyl, heterocyclyl, aryl,

and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from

halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN, O-C₁₋₆ alkyl, CF₃,

aryl, and heteroaryl;

R²¹ is a member selected from the group consisting of C₁₋₁₅ alkyl, C₂₋₁₅ alkenyl, C₂₋

15 alkynyl, heterocyclyl, aryl, and heteroaryl, which alkyl, alkenyl, alkynyl, aryl, heterocyclyl,

and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from

the group of halo, heterocyclyl, aryl, heteroaryl, CF₃, CN, OR²⁰, SR²⁰, N(R²⁰)₂, S(O)R²²,

SO₂R²², SO₂N(R²⁰)₂, SO₂NR²⁰COR²², SO₂NR²⁰CO₂R²², SO₂NR²⁰CON(R²⁰)₂, N(R²⁰)₂

NR²⁰COR²², NR²⁰CO₂R²², NR²⁰CON(R²⁰)₂, NR²⁰C(NR²⁰)NHR²³, COR²⁰, CO₂R²⁰,

CON(R²⁰)₂, CONR²⁰SO₂R²², NR²⁰SO₂R²², SO₂NR²⁰CO₂R²², OR²⁰, OCONR²⁰SO₂R²²,

OC(O)R²⁰, C(O)OCH₂OC(O)R²⁰, and OCON(R²⁰)₂, and each optional heteroaryl, aryl, and heterocyclyl substituent is optionally substituted with halo, alkyl, CF₃, amino, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, NCOR²², NR²⁰SO₂R²², COR²⁰, CO₂R²⁰, CON(R²⁰)₂, NR²⁰CON(R²⁰)₂, OC(O)R²⁰, OC(O)N(R²⁰)₂, SR²⁰, S(O)R²², SO₂R²², SO₂N(R²⁰)₂, CN, or OR²⁰;

R²² is a member selected from the group consisting of C₁₋₁₅ alkyl, C₂₋₁₅ alkenyl, C₂₋₁₅ alkynyl, heterocyclyl, aryl, and heteroaryl, which alkyl, alkenyl, alkynyl, heterocyclyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN, O-C₁₋₆ alkyl, CF₃, aryl, and heteroaryl; and

R²³ is R²¹ or H.

2. A 2,6,9-trisubstituted purine composition of claim 1 wherein:

R₁ is a alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, CF₃, aryl, heteroaryl, heterocyclyl, R²², SR²⁰, S(O)R²¹, SO₂R²¹, SO₂NR²⁰R²³, NR²⁰R²³, NR²⁰COR²¹, NR²⁰CO₂R²¹, NR²⁰CONR²⁰R²³, NR²⁰SO₂R²¹, OR²⁰, CN, CO₂R²⁰, CONR²⁰R²³, and COR²⁰;

R₂ is a hydrogen or hydrocarbon selected from the group substituted alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R²², SR²⁰, S(O)R²¹, SO₂R²¹,

$\text{SO}_2\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{COR}^{21}$, $\text{NR}^{20}\text{CO}_2\text{R}^{21}$, $\text{NR}^{20}\text{CONR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{SO}_2\text{R}^{21}$, OR^{20} , CN , CO_2R^{20} , $\text{CONR}^{20}\text{R}^{23}$, and COR^{20} ;

R_4 and R_5 are each independently hydrogen, OR_{20} , $\text{NR}_{20}\text{R}_{23}$, or a hydrocarbon selected from the group including alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R^{22} , SR^{20} , S(O)R^{21} , SO_2R^{21} , $\text{SO}_2\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{COR}^{21}$, $\text{NR}^{20}\text{CO}_2\text{R}^{21}$, $\text{NR}^{20}\text{CONR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{SO}_2\text{R}^{21}$, OR^{20} , CN , CO_2R^{20} , $\text{CONR}^{20}\text{R}^{23}$, and COR^{20} ;

R^{20} is a member selected from the group consisting of H, C_{1-8} alkyl, C_{2-8} alkenyl, C_{2-15} heterocyclyl, aryl, and heteroaryl, which alkyl, alkenyl, heterocyclyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN , O-C_{1-6} alkyl, CF_3 , aryl, and heteroaryl;

R^{21} is a member selected from the group consisting of C_{1-8} alkyl, C_{2-8} alkenyl, heterocyclyl, aryl, and heteroaryl, which alkyl, alkenyl, aryl, heterocyclyl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from the group of halo, heterocyclyl, aryl, heteroaryl, CF_3 , CN , OR^{20} , SR^{20} , $\text{N(R}^{20})_2$, S(O)R^{22} , SO_2R^{22} , $\text{SO}_2\text{N(R}^{20})_2$, $\text{SO}_2\text{NR}^{20}\text{COR}^{22}$, $\text{SO}_2\text{NR}^{20}\text{CO}_2\text{R}^{22}$, $\text{SO}_2\text{NR}^{20}\text{CON(R}^{20})_2$, $\text{N(R}^{20})_2\text{NR}^{20}\text{COR}^{22}$, $\text{NR}^{20}\text{CO}_2\text{R}^{22}$, $\text{NR}^{20}\text{CON(R}^{20})_2$, $\text{NR}^{20}\text{C(NR}^{20})\text{NHR}^{23}$, COR^{20} , CO_2R^{20} , $\text{CON(R}^{20})_2$, $\text{CONR}^{20}\text{SO}_2\text{R}^{22}$, $\text{NR}^{20}\text{SO}_2\text{R}^{22}$, $\text{SO}_2\text{NR}^{20}\text{CO}_2\text{R}^{22}$, OR^{20} , $\text{OCONR}^{20}\text{SO}_2\text{R}^{22}$, OC(O)R^{20} , $\text{C(O)OCH}_2\text{OC(O)R}^{20}$, and $\text{OCON(R}^{20})_2$, and each optional heteroaryl, aryl, and heterocyclyl substituent is optionally substituted with halo, alkyl, CF_3 , amino, mono- or di-alkylamino, alkyl or aryl or heteroaryl

amide, NCOR^{22} , $\text{NR}^{20}\text{SO}_2\text{R}^{22}$, COR^{20} , CO_2R^{20} , $\text{CON}(\text{R}^{20})_2$, $\text{NR}^{20}\text{CON}(\text{R}^{20})_2$, $\text{OC}(\text{O})\text{R}^{20}$, $\text{OC}(\text{O})\text{N}(\text{R}^{20})_2$, SR^{20} , $\text{S}(\text{O})\text{R}^{22}$, SO_2R^{22} , $\text{SO}_2\text{N}(\text{R}^{20})_2$, CN , or OR^{20} ; and

R^{22} is a member selected from the group consisting of C_{1-8} alkyl, C_{2-8} alkenyl, heterocyclyl, aryl, and heteroaryl, which alkyl, alkenyl, heterocyclyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN , O-C_{1-6} alkyl, CF_3 , aryl, and heteroaryl.

3. A 2,6,9-trisubstituted purine composition of claim 1 wherein:

R'_1 is alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, CF_3 , aryl, heteroaryl, heterocyclyl, R^{22} , SR^{20} , $\text{S}(\text{O})\text{R}^{21}$, SO_2R^{21} , $\text{SO}_2\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{COR}^{21}$, $\text{NR}^{20}\text{CO}_2\text{R}^{21}$, $\text{NR}^{20}\text{SO}_2\text{R}^{21}$, OR^{20} , CN , CO_2R^{20} , $\text{CONR}^{20}\text{R}^{23}$, and COR^{20} ;

R_2 is a hydrogen or hydrocarbon selected from the group including alkyl, heterocyclyl, and aryl, each having one to 10 carbon atoms, which alkyl, heterocyclyl, aryl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R^{22} , SR^{20} , $\text{S}(\text{O})\text{R}^{21}$, SO_2R^{21} , $\text{SO}_2\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{COR}^{21}$, $\text{NR}^{20}\text{CO}_2\text{R}^{21}$, $\text{NR}^{20}\text{SO}_2\text{R}^{21}$, OR^{20} , CN , CO_2R^{20} , $\text{CONR}^{20}\text{R}^{23}$, and COR^{20} ;

R_4 and R_5 are each independently hydrogen, OR_{20} , $\text{NR}_{20}\text{R}_{23}$, or a hydrocarbon selected from the group including alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R^{22} ,

SR²⁰, S(O)R²¹, SO₂R²¹, SO₂NR²⁰R²³, NR²⁰R²³, NR²⁰COR²¹, NR²⁰CO₂R²¹, NR²⁰SO₂R²¹, OR²⁰, CN, CO₂R²⁰, CONR²⁰R²³, and COR²⁰;

R²⁰ is a member selected from the group consisting of H, C₁₋₈alkyl, aryl, and heteroaryl, which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN, O-C₁₋₆ alkyl, CF₃;

R²¹ is a member selected from the group consisting of C₁₋₈ alkyl, aryl, and heteroaryl, which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 2 substituents independently selected from the group of halo, CF₃, CN, OR²⁰, SR²⁰, N(R²⁰)₂, S(O)R²², SO₂R²², SO₂N(R²⁰)₂, NR²⁰CO₂R²², NR²⁰CON(R²⁰)₂, COR²⁰, CO₂R²⁰, CON(R²⁰)₂, NR²⁰SO₂R²², OR²⁰; and

R²² is a member selected from the group consisting of C₁₋₈ alkyl, aryl, and heteroaryl, which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN, O-C₁₋₆ alkyl, CF₃, aryl, and heteroaryl.

4. A 2,6,9-trisubstituted purine composition of claim 1 wherein:

R'₁ is a alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, alkenyl, and alkynyl, are optionally with from 1 to 2 substituents independently selected from the group consisting of halo, CF₃, aryl, R²², SR²⁰, S(O)R²¹, SO₂R²¹, SO₂NR²⁰R²³, NR²⁰R²³, NR²⁰COR²¹, NR²⁰CO₂R²¹, NR²⁰SO₂R²¹, OR²⁰, CN, CO₂R²⁰, and CONR²⁰R²³;

R_2 is a hydrogen or hydrocarbon selected from the group alkyl, heterocyclyl, and aryl, each having one to 10 carbon atoms, which alkyl, heterocyclyl, aryl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $SO_2NR^{20}R^{23}$, $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}SO_2R^{21}$, OR^{20} , CN, CO_2R^{20} , $CONR^{20}R^{23}$, and COR^{20} ;

R_4 and R_5 are each independently hydrogen, or a hydrocarbon selected from the group including alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, aryl, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $SO_2NR^{20}R^{23}$, $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}SO_2R^{21}$, OR^{20} , CN, CO_2R^{20} , and $CONR^{20}R^{23}$;

R^{20} is a member selected from the group consisting of H, C_{1-8} alkyl, aryl, and heteroaryl, which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN, $O-C_{1-6}$ alkyl, CF_3 ;

R^{21} is a member selected from the group consisting of C_{1-8} alkyl, aryl, and heteroaryl, which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 2 substituents independently selected from the group of halo, CF_3 , CN, OR^{20} , SR^{20} , $N(R^{20})_2$, $S(O)R^{22}$, SO_2R^{22} , $SO_2N(R^{20})_2$, $NR^{20}CO_2R^{22}$, $NR^{20}CON(R^{20})_2$, COR^{20} , CO_2R^{20} , $CON(R^{20})_2$, $NR^{20}SO_2R^{22}$, OR^{20} ; and

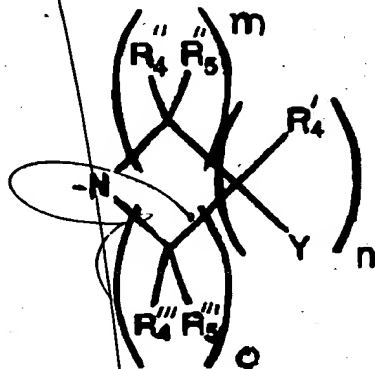
R^{22} is a member selected from the group consisting of C_{1-8} alkyl, aryl, and heteroaryl, which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents

independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl or heteroaryl amide, CN, O-C₁₋₆ alkyl, CF₃, aryl, and heteroaryl.

5. The 2,6,9-trisubstituted purine composition of claim 1 wherein X=NH.

6. The 2,6,9-trisubstituted purine composition of claim 1 wherein R₃ is a component

5 having the formula:



where m=1-3, n=1-3, o=1,3, y=carbonyl, -NR₄R₅, hydroxyl, thiol, alkoxy, alkylthiol with the provisos that when Y is carbonyl, Y and R₄' together may be a single oxygen atom, R₄'' and R₅'' may together be a single oxygen atom, R₄''' and R₅''' may together be a single oxygen atom; and

R₄ and R₅ are each independently hydrogen, or a hydrocarbon selected from the group including alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, aryl, R²², SR²⁰, S(O)R²¹, SO₂R²¹, SO₂NR²⁰R²³, NR²⁰R²³, NR²⁰COR²¹, NR²⁰CO₂R²¹, NR²⁰SO₂R²¹, OR²⁰, CN, CO₂R²⁰, and CONR²⁰R²³.

7. The 2,6,9-trisubstituted purine composition of claim 3 wherein R₁' is selected

from the group consisting of aralkyl and heteroarylalkyl.

8. The 2,6,9-trisubstituted purine composition of claim 7 wherein R_1' is selected from the group consisting of aralkyl, unsubstituted pyridylalkyl and substituted pyridylalkyl and wherein R_2 is selected from the group consisting of lower alkyl, substituted lower alkyl, and alkyl-cycloalkyl.

9. A 2,6,9-trisubstituted purine composition of claim 5 wherein:

R_1' is an aryl, heteroaryl, heterocyclyl, aralkyl, heteroarylalkyl, each having one to 20 carbon atoms, which aryl, heteroaryl, heterocyclyl, aralkyl, heteroarylalkyl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, CF_3 , aryl, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $SO_2NR^{20}R^{23}$, $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}SO_2R^{21}$, OR^{20} , CN, CO_2R^{20} , and $CONR^{20}R^{23}$;

R_2 is a hydrogen or hydrocarbon selected from the group substituted lower alkyl, substituted alkyl, cycloalkyl, substituted cycloalkyl each having one to 10 carbon atoms wherein substitution includes optional substitution with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , SR^{20} , $S(O)R^{21}$, SO_2R^{21} , $NR^{20}R^{23}$, OR^{20} , and CN;

R_4 and R_5 are each independently hydrogen, or a hydrocarbon selected from the group including alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, alkenyl, and alkynyl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, aryl, R^{22} , SR^{20} , $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}SO_2R^{21}$, OR^{20} , CN, CO_2R^{20} , and $CONR^{20}R^{23}$;

R^{21} is a member selected from the group consisting of C_{1-8} alkyl, which alkyl is optionally substituted with 1 to 2 substituents independently selected from the group of halo, CF_3 , CN, OR^{20} , SR^{20} , $N(R^{20})_2$; and

10. The 2,6,9-trisubstituted purine composition of claim 3 wherein R₁' is selected from the group consisting of aryl, heterocyclyl, heteroaryl, substituted heteroaryl, and substituted aryl.

11. The 2,6,9-trisubstituted purine composition of claim 3 wherein R₁' is selected from the group consisting of aryl, unsubstituted pyridyl, substituted pyridyl, and substituted aryl, and R₂ is selected from the group consisting of alkyl, substituted alkyl.

12. The 2,6,9-trisubstituted purine composition of claim 2 wherein R₃ is -NR₄R₅ wherein R₄ and R₅ are each selected from the group consisting of hydrogen, alkyl, heterocyclyl, acyl, aryl, heteroaryl, aralkyl, heteroaralkyl, alkyl alkenyl, alkyl alkynyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, heteroarylalkyl, are optionally substituted with from 1 to 3 substituents independently selected from the group consisting of halo, aryl, heteroaryl, heterocyclyl, R²², SR²⁰, S(O)R²¹, SO₂R²¹, SO₂NR²⁰R²³, NR²⁰R²³, NR²⁰COR²¹, NR²⁰CO₂R²¹, NR²⁰CONR²⁰R²³, NR²⁰SO₂R²¹, OR²⁰, CN,

CO_2R^{20} , $\text{CONR}^{20}\text{R}^{23}$, and COR^{20} .

13. A 2,6,9-trisubstituted purine composition of claim 12 wherein:

R'_1 is an aryl, substituted aryl, each having 6 carbon atoms wherein substitution includes optional substitution with from 1 to 2 substituents independently selected from the group consisting of halo, CF_3 , aryl, R^{22} , $\text{NR}^{20}\text{R}^{23}$, $\text{NR}^{20}\text{COR}^{21}$, OR^{20} , CN;

R_2 is a hydrogen or hydrocarbon selected from the group substituted lower alkyl, cycloalkyl, substituted cycloalkyl each having one to 6 carbon atoms wherein substitution includes optional substitution with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , $\text{NR}^{20}\text{R}^{23}$, OR^{20} ;

R_4 and R_5 are each independently hydrogen, or a hydrocarbon selected from the group including alkyl, and heterocyclyl wherein each hydrocarbon has from 1 to 12 carbon atoms, which alkyl, and heterocyclyl are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , SR^{20} , OR^{20} , $\text{NR}^{20}\text{R}^{23}$, CN, CO_2R^{20} , and $\text{CONR}^{20}\text{R}^{23}$;

R^{20} is a member selected from the group consisting of H, C_{1-8} alkyl;

R^{21} is a member selected from the group consisting of C_{1-3} alkyl, which alkyl is optionally substituted with 1 to 2 substituents independently selected from the group of halo, CF_3 , CN, OR^{20} , SR^{20} , $\text{N}(\text{R}^{20})_2$; and

R^{22} is a member selected from the group consisting of C_{1-3} alkyl, aryl, heteroaryl which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl, CN, O-C_{1-6} alkyl, CF_3 .

14. A 2,6,9-trisubstituted purine composition of claim 12 wherein:

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R'₁ is an aryl, substituted aryl, each having 6 carbon atoms wherein substitution includes optional substitution with from 1 to 2 substituents independently selected from the group consisting of halo, CF₃, R²², OR²⁰, CN;

R₂ is isopropyl;

5 R₄ and R₅ are each independently hydrogen, or a hydrocarbon selected from the group including alkyl, and heterocyclyl wherein each hydrocarbon has from 1 to 12 carbon atoms, which alkyl, and heterocyclyl are optionally substituted with from 1 substituent independently selected from the group consisting of R²², OR²⁰, NR²⁰R²³;

R²⁰ is a member selected from the group consisting of H, C₁₋₂alkyl;

10 R²¹ is a member selected from the group consisting of C₁₋₃ alkyl;

R²² is a member selected from the group consisting of C₁₋₃alkyl, aryl, which alkyl, aryl, are optionally substituted with 1 substituent independently selected from halo, alkyl, mono- or dialkylamino, CN, CF₃; and

R²³ is R²¹ or H.

15 15. A 2,6,9-trisubstituted purine composition of claim 12 wherein:

R'₁ is an aralkyl, substituted aralkyl, each having 6-8 carbon atoms wherein substitution includes optional substitution with from 1 to 2 substituents independently selected from the group consisting of halo, CF₃, aryl, R²², NR²⁰R²³, NR²⁰COR²¹, OR²⁰, CN;

20 R₂ is a hydrogen or hydrocarbon selected from the group substituted alkyl, cycloalkyl, substituted cycloalkyl each having one to 6 carbon atoms wherein substitution includes optional substitution with from 1 substituent independently selected from the group consisting of halo, R²², NR²⁰R²³, OR²⁰;

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R_4 and R_5 are each independently hydrogen, or a hydrocarbon selected from the group including alkyl and heterocyclyl wherein each hydrocarbon has from 1 to 12 carbon atoms, which alkyl and heterocyclyl are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , SR^{20} , OR^{20} , $NR^{20}R^{23}$, CN, CO_2R^{20} , and $CONR^{20}R^2$;

R^{20} is a member selected from the group consisting of H, C_{1-8} alkyl;

R^{21} is a member selected from the group consisting of C_{1-3} alkyl, which alkyl is optionally substituted with 1 to 2 substituents independently selected from the group of halo, CF_3 , CN, OR^{20} , SR^{20} , $N(R^{20})_2$; and

R^{22} is a member selected from the group consisting of C_{1-3} alkyl, aryl, heteroaryl which alkyl, aryl, and heteroaryl are optionally substituted with 1 to 3 substituents independently selected from halo, alkyl, mono- or dialkylamino, alkyl or aryl, CN, O- C_{1-6} alkyl, CF_3 .

16. A 2,6,9-trisubstituted purine composition of claim 12 wherein:

R'_1 is $-CH_2$ -phenyl wherein the phenyl ring is optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, CF_3 , R^{22} , OR^{20} , CN;

R_2 is isopropyl;

R_4 and R_5 are each independently hydrogen, or a hydrocarbon selected from the group including alkyl, and heterocyclyl wherein each hydrocarbon has from 1 to 12 carbon atoms, which alkyl, and heterocyclyl are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of R^{22} , OR^{20} , $NR^{20}R^{23}$;

R^{20} is a member selected from the group consisting of H, C_{1-2} alkyl;

R^{21} is a member selected from the group consisting of C_{1-3} alkyl;

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R^{22} is a member selected from the group consisting of C_{1-3} alkyl, aryl, which alkyl, aryl, are optionally substituted with 1 substituent independently selected from halo, alkyl, mono- or dialkylamino, CN, CF_3 ; and

R^{23} is R^{21} or H.

5 17. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is selected from the group consisting of aralkyl, substituted pyridylalkyl, and unsubstituted pyridylalkyl;

R_2 is selected from the group consisting of alkyl, which alkyl is optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , $NR^{20}R^{23}$, OR^{20} ;

10 R_4 is a substituted alkyl having from 2 to 6 carbon atoms optionally substituted with from 1 to 3 substituents independently selected from the group consisting of R^{22} , OR^{20} , $NR^{20}R^{23}$;

15 R_5 is selected from the group consisting of hydrogen, alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, aryl, R^{22} , SR^{20} , $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}SO_2R^{21}$, OR^{20} , CN, CO_2R^{20} , and $CONR^{20}R^{23}$;

R^{20} is a member selected from the group consisting of H, C_{1-2} alkyl;

R^{21} is a member selected from the group consisting of C_{1-3} alkyl;

20 R^{22} is a member selected from the group consisting of C_{1-3} alkyl, aryl, which alkyl, aryl, are optionally substituted with 1 substituent independently selected from halo, alkyl, mono- or dialkylamino, CN, CF_3 ; and

R^{23} is R^{21} or H.

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18. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is selected from the group consisting of aryl, substituted aryl, pyridyl, and substituted pyridyl;

R_2 is selected from the group consisting of alkyl, which alkyl is optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , $NR^{20}R^{23}$, OR^{20} ;

R_4 is a substituted alkyl having from 2 to 6 carbon atoms optionally substituted with from 1 to 3 substituents independently selected from the group consisting of R^{22} , OR^{20} , $NR^{20}R^{23}$;

R_5 is selected from the group consisting of hydrogen, alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, each having one to 20 carbon atoms, which alkyl, acyl, heterocyclyl, aryl, heteroaryl, aralkyl, are optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, aryl, R^{22} , SR^{20} , $NR^{20}R^{23}$, $NR^{20}COR^{21}$, $NR^{20}CO_2R^{21}$, $NR^{20}SO_2R^{21}$, OR^{20} , CN, CO_2R^{20} , and $CONR^{20}R^{23}$;

R^{20} is a member selected from the group consisting of H, C_{1-2} alkyl;

R^{21} is a member selected from the group consisting of C_{1-3} alkyl;

R^{22} is a member selected from the group consisting of C_{1-3} alkyl, aryl, which alkyl, aryl, are optionally substituted with 1 substituent independently selected from halo, alkyl, mono- or dialkylamino, CN, CF_3 ; and

R^{23} is R^{21} or H.

19. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is selected from the group consisting of aralkyl, pyridylalkyl, and substituted pyridylalkyl;

R_2 is selected from the group consisting of alkyl, which alkyl is optionally substituted with from 1 to 2 substituents independently selected from the group consisting of halo, R^{22} , and OR^{20} ;

R_4 and R_5 are each a substituted alkyl having from 2 to 6 carbon atoms optionally substituted with from 1 substituent independently selected from the group consisting of R^{22} , $NR^{20}R^{23}$, and OR^{20} ;

R^{20} is a member selected from the group consisting of H, C_{1-2} alkyl;

R^{21} is a member selected from the group consisting of C_{1-3} alkyl;

R^{22} is a member selected from the group consisting of C_{1-3} alkyl; and

R^{23} is R^{21} or H.

20. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is CH_2 -aryl or CH_2 -substituted aryl, R_2 is lower alkyl or substituted lower alkyl, and R_4 and R_5 are each $-CH_2CH_2OH$, $-CHR'CH_2OH$, or $-CH_2CHR'OH$ wherein R' is hydrogen or alkyl having from 1 to 6 carbon atoms.

21. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is CH_2 -Aryl or CH_2 -substituted aryl, R_2 is lower alkyl, and $R_4 = H$, and R_5 is $-CH_2CH_2NH_2$, $CHR'CH_2NH_2$, $-CH_2CHR'NH_2$ wherein R' is hydrogen or alkyl having from 1 to 6 carbon atoms.

22. The 2,6,9-trisubstituted purine composition of claim 21 wherein R_2 is isopropyl.

23. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is CH_2 -Aryl or CH_2 -substituted aryl, R_2 is lower alkyl, and $R_4 = -CH_2CH_2OH$ R_5 is $CH_2CH_2NH_2$, or

-CHR'CH₂NH₂, or -CH₂CHR'NH₂ wherein R' is hydrogen or alkyl having from 1 to 6 carbon atoms.

24. The 2,6,9-trisubstituted purine composition of claim 23 wherein R₂ is isopropyl.

5 25. The 2,6,9-trisubstituted purine composition of claim 20 wherein R₂ is isopropyl.

26. The 2,6,9-trisubstituted purine composition of claim 12 wherein R₁' is selected from the group consisting of aryl, substituted aryl, pyridyl, and substituted pyridyl, R₂ is selected from the group consisting of lower alkyl, substituted lower alkyl, and alkyl
10 cycloalkyl, and R₄ and R₅ are each a substituted lower alkyl having from 2 to 6 carbon atoms.

27. The 2,6,9-trisubstituted purine composition of claim 12 wherein R₁' is aryl or substituted aryl, R₂ is lower alkyl, or substituted lower alkyl, and R₄ and R₅ are each CH₂CH₂OH, -CHR'CH₂OH, or -CH₂CHR'OH wherein R' is hydrogen or alkyl having from
1 to 6 carbon atoms.

15 28. The 2,6,9-trisubstituted purine composition of claim 27 wherein R₂ is isopropyl.

29. The 2,6,9-trisubstituted purine composition of claim 12 wherein R₁' is benzyl substituted with a halogen, alkoxy, phenyl, pyridyl or nitro group, R₂ is isopropyl, and R₄ and R₅ are each -CH₂CH₂OH.

20 30. The 2,6,9-trisubstituted purine composition of claim 12 wherein R₁' is benzyl substituted with a halogen, alkoxy, phenyl, pyridyl or nitro group, R₂ is isopropyl, R₄ = H, and R₅ = CH₂CH₂NH₂.

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31. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is benzyl substituted with a halogen, alkoxy, C_{1-3} alkyl, CF_3 , phenyl, pyridyl or nitro group, R_2 is isopropyl, $R_4 = H$, and $R_5 = CH_2CHR'NH_2$ wherein R' is hydrogen or alkyl having from 1 to 6 carbon atoms.

32. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is benzyl substituted with a halogen, alkoxy, C_{1-3} alkyl, CF_3 , phenyl, pyridyl or nitro group, R_2 is isopropyl, $R_4 = H$, and $R_5 = CH_2CR'R'NH_2$ wherein R' is hydrogen or alkyl having from 1 to 6 carbon atoms.

33. The 2,6,9-trisubstituted purine composition of claim 1 selected from the group consisting of 2-((2-hydroxyethyl)[9-(methylethyl)-6-({[4-(trifluoromethyl)phenyl]methyl}amino)purin-2-yl]amino)ethan-1-ol, (((2S)oxolan-2-yl)methyl)(6-({[4-fluorophenyl]methyl}amino)-9-(methylethyl)purin-2-yl)amine, [((2R)oxolan-2-yl)methyl](6-({[4-fluorophenyl]methyl}amino)-9-(methylethyl)purin-2-yl)amine, (2-aminoethyl)(6-({[3,5-dichlorophenyl]methyl}amino)-9-(methylethyl)purin-2-yl)amine, (2-aminoethyl)[6-({[4-chloro-3-(trifluoromethyl)phenyl]methyl}amino)-9-(methylethyl)purin-2-yl]amine, [-(6-({[4-chlorophenyl]methyl}amino)-9-(methylethyl)purin-2-yl)amino]-3-methylbutanamide, (2-amino-2-methylpropyl)(6-({[4-chlorophenyl]methyl}amino)-9-(methylethyl)purin-2-yl)amine, 3-(2-[bis(2-hydroxyethyl)amino]-6-({[4-chlorophenyl]methyl}amino)purin-9-yl)butan-2-one, 2-[(6-({[4-chlorophenyl]methyl}amino)-9-(methylethyl)purin-2-yl)amino]-3-methylbutan-1-ol, 4-[(2-[(2-aminoethyl)amino]-9-(methylethyl)purin-6-yl)amino)methyl]benzenesulfonamide, 2-[(2-hydroxyethyl)(6-({[4-

methoxyphenyl)methyl]amino}-9-(methylethyl)purin-2-yl)amino]ethan-1-ol, 2-((2-hydroxyethyl){9-(methylethyl)-6-[(4-phenylphenyl)amino]purin-2-yl}amino)ethan-1-ol, {2-[(2-amino-2-propyl)amino]-9-(methylethyl)purin-6-yl}[(4-chlorophenyl)methyl]amine, {2-[(2-aminoethyl)amino]-9-(methylethyl)purin-6-yl}[(4-chlorophenyl)methyl]amine, 5 {2-[(2-aminopropyl)amino]-9-(methylethyl)purin-6-yl}[(4-chlorophenyl)methyl]amine and 2-[(2-aminoethyl)(6-[(4-chlorophenyl)methyl]amino)-9-(methylethyl)purin-2-yl)amino]ethan-1-ol.

34. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is phenyl substituted with a halogen, alkoxy, phenyl, pyridyl or nitro group, R_2 is isopropyl, and R_4 and 10 R_5 are each $-CH_2CH_2OH$.

35. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is biphenylmethyl, R_2 is isopropyl, and R_4 and R_5 are each $-CH_2CH_2OH$.

36. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_1' is selected from the group consisting of 3-methylthiophenyl, 4-methylthiophenyl, 4-phenylbenzyl, 4-methoxybenzyl, 4-biphenyl, 3-methoxybenzyl, 4-(2-thienyl)benzyl, 4-(4-methyl)phenylbenzyl, 15 4-(4-trifluoromethyl)phenylbenzyl, 4-(4-nitrilo)phenylbenzyl, 4-(2-pyridinyl)benzyl, piperonyl, 3-methoxybenzyl, 4-chlorobenzyl, and 4-nitrobenzyl, R_2 is isopropyl, and R_4 and R_5 are both CH_2CH_2OH .

37. The 2,6,9-trisubstituted purine composition of claim 36 wherein R_1' is selected 20 from the group of compounds consisting of 4-methoxybenzyl, 4-phenylbenzyl, 4-methoxybenzyl, 4-biphenyl, 3-methoxybenzyl, 4-(2-thienyl)benzyl, 4-(4-methyl)phenylbenzyl, 4-(4-trifluoromethyl)phenylbenzyl, 4-(4-nitrilo)phenylbenzyl, 4-(2-pyridinyl)benzyl, piperonyl, 3-thiomethoxyphenyl, 4-thiomethoxyphenyl and 4-bromophenyl.

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38. A cationic salt of the composition of claim 1.

39. An acid addition salt of the composition of claim 1.

40. A method for inhibiting cell proliferation in mammals comprising administering a therapeutically effective amount of the composition of claim 1 to the mammal.

41. The method of claim 40 wherein the therapeutically effective amount ranges from about 0.001 to about 100 mg/kg weight of the mammal.

42. The method of claim 40 wherein the composition is administered to a mammal suffering from a cell proliferation disorder selected from the group consisting of rheumatoid arthritis, lupus, type I diabetes, multiple sclerosis, cancer, restenosis following balloon angioplasty or atherectomy, restenosis following vascular modifying surgical procedures, host graft disease, and gout.

43. The method of claim 42 wherein the cell proliferation disorder is restenosis.

44. The method of claim 42 wherein the cell proliferation is disorder cancer.

45. The method of claim 42 wherein the cell proliferation disorder is polycystic kidney disease.

46. The method of claim 42 wherein the mammal is a human.

47. A pharmaceutical composition of matter comprising the composition of claim 1 and one or more pharmaceutical excipients.

48. An antifungal agent useful for treating fungal infections in humans, and animals comprising the composition of claim 1.

49. The method of claim 42 wherein the cell proliferation disorder is selected from the group consisting of lymphoid neoplasm, cancer of the colon, breast cancer,

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